

EXHIBIT 1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

REPLY TO OFFICE ACTION UNDER *EX PARTE*
REEXAMINATION DATED 02/07/05Atty. Docket No.
CROSS1123-17
CROSS1123-19

Applicants

Geoffrey B. Hoese, et al.Reexamination Control
Number**90/007,125****90/007,317**

Date Filed

07/19/2004**11/23/2004**

Title

**Storage Router and Method for Providing Virtual
Local Storage**

Group Art Unit

2182

Examiner

Fleming, Fritz

Confirmation Number:

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Patent No.

6,425,035

6548 U.S. PTO

04/06/05

Commissioner for Patents
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Dear Sir:

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Signature**JULIE H. BLACKARD**
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In response to the Official Action mailed February 7, 2005, Applicant respectfully requests the Examiner reconsider the rejections of the Claims in the Re-Examination of U.S. Patent 6,425,035 (the "035 Patent") in view of the this reply.

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IN THE CLAIMS:

1. A storage router for providing virtual local storage on remote storage devices to devices, comprising:
a buffer providing memory work space for the storage router;
a first controller operable to connect to and interface with a first transport medium;
a second controller operable to connect to and interface with a second transport medium; and
a supervisor unit coupled to the first controller, the second controller and the buffer, the supervisor unit operable to map between devices connected to the first transport medium and the storage devices, to implement access controls for storage space on the storage devices and to process data in the buffer to interface between the first controller and the second controller to allow access from devices connected to the first transport medium to the storage devices using native low level, block protocols.
2. The storage router of claim 1, wherein the supervisor unit maintains an allocation of subsets of storage space to associated devices connected to the first transport medium, wherein each subset is only accessible by the associated device connected to the first transport medium.
3. The storage router of claim 2, wherein the devices connected to the first transport medium comprise workstations.
4. The storage router of claim 2, wherein the storage devices comprise hard disk drives.
5. The storage router of claim 1, wherein the first controller comprises:
a first protocol unit operable to connect to the first transport medium;
a first-in-first-out queue coupled to the first protocol unit; and
a direct memory access (DMA) interface coupled to the first-in-first-out queue and to the buffer.
6. The storage router of claim 1, wherein the second controller comprises:
a second protocol unit operable to connect to the second transport medium;
an internal buffer coupled to the second protocol unit; and

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a direct memory access (DMA) interface coupled to the internal buffer and to the buffer of the storage router.

7. A storage network, comprising:

a first transport medium;

a second transport medium;

a plurality of workstations connected to the first transport medium;

a plurality of storage devices connected to the second transport medium; and

a storage router interfacing between the first transport medium and the second transport medium, the storage router providing virtual local storage on the storage devices to the workstations and operable:

to map between the workstations and the storage devices;

to implement access controls for storage space on the storage devices; and

to allow access from the workstations to the storage devices using native low level, block protocol in accordance with the mapping and access controls.

8. The storage network of claim 7, wherein the access controls include an allocation of subsets of storage space to associated workstations, wherein each subset is only accessible by the associated workstation.

9. The storage network of claim 7, wherein the storage devices comprise hard disk drives.

10. The storage network of claim 7, wherein the storage router comprises:

a buffer providing memory work space for the storage router;

a first controller operable to connect to and interface with the first transport medium, the first controller further operable to pull outgoing data from the buffer and to place incoming data into the buffer;

a second controller operable to connect to and interface with the second transport medium, the second controller further operable to pull outgoing data from the buffer and to place incoming data into the buffer; and

a supervisor unit coupled to the first controller, the second controller and the buffer, the supervisor unit operable:

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to map between devices connected to the first transport medium and the storage devices, to implement the access controls for storage space on the storage devices and to process data in the buffer to interface between the first controller and the second controller to allow access from workstations to storage devices.

11. A method for providing virtual local storage on remote storage devices connected to one transport medium to devices connected to another transport medium, comprising:

- interfacing with a first transport medium;
- interfacing with a second transport medium;
- mapping between devices connected to the first transport medium and the storage devices and implementing access controls for storage space on the storage devices;
- and
- allowing access from devices connected to the first transport medium to the storage devices using native low level, block protocols.

12. The method of claim 11, wherein mapping between devices connected to the first transport medium and the storage devices includes allocating subsets of storage space to associated devices connected to the first transport medium, wherein each subset is only accessible by the associated device connected to the first transport medium.

13. The method of claim 12, wherein the devices connected to the first transport medium comprise workstations.

14. The method of claim 12, wherein the storage devices comprise hard disk drives.

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REMARKS

Applicants appreciate the time taken by the Examiner to review the claims under reexamination and the thoroughness of the remarks provided by the Examiner in the Office Action mailed February 7, 2005. The '035 Patent has been carefully reviewed in light of that Office Action. Based on that review and the remarks made below, Applicants respectfully request reconsideration and favorable action in this case.

I. Rejections Under 35 U.S.C. §102(b)

A. Introduction

Claims 7-9 and 11-14 are rejected under 35 U.S.C. 102(b) as being anticipated by "Petal: Distributed Virtual Disks" ("Petal").

Anticipation under § 102 requires that "each and every element as set forth in the claim is found, either expressly or inherently described in a single prior art reference." See, *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 621, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown and the elements must be arranged as required by the claim. See, *Richardson v. Suzuki Motor Co.* 868 F.2d 1226, 1236, 9 USPQ 2d 1913, 1920 (Fed. Cir. 1989) and *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990). See also, MPEP 2131. However, a reference must be enabling to be anticipatory. See, *Amgen, Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1354, 65 USPQ2d 1385, 1416 (Fed. Cir. 2003) ("A claimed invention cannot be anticipated by a prior art reference if the allegedly anticipatory disclosures cited as prior art are not enabled").

As detailed more fully below, Applicants respectfully submit that neither independent Claim 7 nor independent Claim 11 is anticipated (or rendered obvious) by Petal, as Petal does not disclose, teach or suggest certain limitations of these claims, including: i) allowing devices (e.g., workstations) connected to a first data transport medium to access storage devices using native low level block protocols, ii) mapping between devices (e.g., workstations) connected to the first transport medium and the storage devices and iii) implementing access controls.

B. Claims 11-14

The Examiner devoted a large portion of the Office Action to Claim 11. Accordingly, Applicants will first show how Claim 11 differs from the Petal reference cited by the Examiner, and then address the other Claims.

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1. Overview of Claim 11

Claim 11 recites:

A method for providing virtual local storage on remote storage devices connected to one transport medium to devices connected to another transport medium, comprising:
interfacing with a first transport medium;
interfacing with a second transport medium;
mapping between devices connected to the first transport medium and the storage devices and that implements access controls for storage space on the storage devices; and
allowing access from devices connected to the first transport medium to the storage devices using native low level block protocols. [emphasis added].

Claim 11 includes the limitations of (i) "mapping between devices connected to a first transport medium and storage devices", (ii) "implement[ing] access controls" and (iii) "allowing access from devices connected to the first transport medium to the storage devices using native low level block protocols". These features of the present invention allow a host (e.g., workstation) connected to the first transport medium (e.g., Fibre Channel (FC)) to access only that portion (or portions) of the storage devices associated with that particular host. These features also allow a host (or hosts) to communicate with storage devices using only native low level block protocols ("NLLBPs").

2. Petal Does Not Disclose "Allowing Access" From A Workstation Using NLLBP

Claim 11, as discussed above, recites "allowing access from devices connected to the first transport medium to the storage device using native low level block protocols." The "devices connected to the first transport medium" may comprise computer workstations in one exemplary embodiment of the present invention. A NLLBP is a protocol that enables workstations and network servers to exchange information with storage devices without the overhead of high-level protocols and file systems typically required by network servers. As explained below, this definition for NLLBP is supported by both the Specification of the '035 Patent, and the judicial interpretation of a similar limitation by Judge Sparks of the U.S. District Court for the Western District of Texas (an interpretation upheld on appeal by the Court of Appeals for the Federal Circuit).

In systems prior to the present invention, when a computer workstation would make a storage request to a storage device (e.g., disk drive) through a network server, the workstation

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first had to translate the request from its file system protocols to higher level network protocols to communicate with the network server. The network server then would translate these high level protocols into low level requests to the storage device(s). See '035 Patent Specification, col. 1, lines 50-60 and col. 3, lines 14-15 (distinguishing an NLLBP from higher-level protocols by contrasting the present invention to prior art solutions). This high level to low level translation wastes valuable time and makes the access of information occur at a much slower rate. See '035 Patent Specification, col. 1, lines 50-60.

Further, in *Crossroads v. Chaparral Network Storage, Inc.*, Western District of Texas, Civil Action No. A-00-CA-217-SS and *Crossroads Systems (Texas), Inc., v. Pathlight Technology, Inc.*, Western District of Texas, Civil Action No. A-00CA-248-JN (collectively, the "Chaparral Litigation"), the U.S. District Court for the Western District of Texas issued a Joint Markman Order (the "Markman Order") interpreting the term NLLBP for the purposes of United States Patent No. 5,941,972 (the "'972 Patent"), the parent of the '035 Patent, as follows:

a set of rules or standards that enable computers to exchange information and do not involve the overhead of high level protocols and file systems typically required by network servers.

A copy of the Markman Order is attached hereto as Exhibit A. This construction, and the validity of the '972 Patent, was upheld by the Federal Circuit on appeal. A copy of the Federal Circuit decision affirming the decision of the lower court is attached hereto as Exhibit B. Thus, based on the Markman Order, an NLLBP is a protocol that enables computers to exchange information without the overhead of high-level protocols and file systems typically required by network servers.

As discussed in the '035 Patent, allowing access from host devices (e.g., workstations) to storage devices is done using NLLBPs in the present invention. Using the example of a first transport medium of Fibre Channel ("FC") and second transport medium of Small Computer System Interface ("SCSI"), a FC-connected workstation can communicate low level SCSI commands directly to a storage device using NLLBPs. For this example, the present invention accomplishes this by encapsulating the low level SCSI commands in an FC 'wrapper' or 'layer.' The specification of the '035 Patent discusses an exemplary embodiment where a Fibre Channel attached initiator (e.g., a workstation) issues SCSI-3 FCP commands, and an associated SCSI target storage device operates on a SCSI-2 protocol (See '753, col. 6, lines 33-45). In this case, a storage router connected between the host device and the storage device receives the FC-encapsulated low level SCSI commands, removes the FC

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encapsulation, and forwards the low level SCSI commands to the storage devices (provided the workstation is allowed to have such access, as will be discussed more fully below). In this example, there is no translation of the commands from a higher level protocol to a low level protocol. In other words, the storage router is not required to translate some high level command from the workstation (e.g., a file system command, or function call with arguments) into a low level SCSI command. Rather, the storage router simply strips the FC 'layer' off of the existing SCSI command, and forwards the SCSI command to the storage device without any high-to-low level translation (because no such high level to low level translation is needed). Thus, when a host workstation is allowed to have access to a storage device, that access is accomplished using only NLLBPs.

Petal, on the other hand, discloses a system in which Petal clients (i.e., workstations) send higher-level protocol commands to the Petal Server that, in turn, transforms these higher-level, higher overhead commands into low-level SCSI commands that are forwarded to the storage devices (i.e., at least one high level to low level translation takes place between the workstation and the storage device). Petal clients are configured with a Petal device driver in the kernel layer of the Petal client. See, *Petal* page 88, col. 2, section 3. Higher level applications (i.e., user space applications) see virtual disks (representations of the storage devices) through the Unix File System. See *Petal*, page 90, col. 1, section 3.2. When a Petal client wishes to access a storage device behind the Petal server, the client issues a file system command to the virtual disk which is passed through the class layer to the Petal device driver (i.e., the kernel layer process for accessing the virtual disk). The Petal device driver then issues a remote procedure call ("RPC") using the User Datagram Protocol ("UDP") to the Petal server to read or write data. See, *Id* at page 88, col. 2, section 3 (describing the RPC interface) and page 89, col. 1, section 3.1 (describing handling read and write requests). The Petal device driver acts as a filter driver to translate the command to the virtual disk seen by the user space application into an RPC that is sent out in UDP packets.

An RPC is a well known mechanism in networked operating systems and is essentially a function call to the Petal Server. In issuing an RPC, a client will provide a server with the appropriate arguments in a UDP packet so that the server can perform some process. The Petal Server performs a transformation when receiving the RPC in the UDP packet by processing the RPC in the UDP packet to execute the called process and generate the appropriate low level SCSI READ and WRITE commands. Thus, the Petal client uses the traditional network mechanism of issuing a higher level command (e.g., an RPC in a UDP

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packet) to the network server that the network server processes to call a function. The Petal server must execute the appropriate function to transform the information in the UDP packets to the appropriate low level SCSI command.

Thus, the Petal system does not allow the client (i.e., workstation) to access the storage devices using an NLLBP. Instead, the Petal client uses a scheme in which high level file system commands to virtual disks are translated into RPCs which are packaged in UDP packets and transported to the Petal server for transformation into low level commands. Unlike the NLLBP commands described and claimed in the '035 Patent, these RPC in UDP packets contain additional higher level overhead and require transformation to low level SCSI commands at the Petal Server. As noted above, the Petal server executes the called procedure to translate the RPC in UDP to the appropriate low level SCSI command.

The process of Petal therefore requires first creating an RPC, and then encapsulating the RPC in UDP at the Petal client, and further executing a procedure to transform the RPC in UDP to a low level SCSI command. Consequently, while the Examiner has pointed out various portions of Petal that discuss using block-level (i.e., low level) storage protocols (e.g., SCSI commands), it is only in the context of the time period after high level RPCs have been transformed to low level SCSI commands. The system of Petal is the type of system that the present invention was designed to overcome, because the system of Petal does involve the overhead of high level protocols (i.e., RPCs) typically required by network servers (i.e., RPCs), and requires a transformation of the high level protocols into low level SCSI commands at the Petal server.

Therefore, Petal does not disclose, teach or suggest a system for "allowing access from devices connected to the first transport medium to the storage devices using native low level block protocols," as recited in independent Claim 11.

3. Petal Does Not Disclose "Mapping Between Devices Connected To The First Transport Medium And The Storage Devices"

Claim 11 also recites "mapping between devices connected to the first transport medium and the storage devices." Mapping between devices connected to the first transport medium and storage devices in the present invention refers to a mapping between the workstations and storage devices such that a particular workstation on the first transport medium is associated with a storage device, storage devices, or portions thereof, on the second transport medium. As discussed in the '035 Patent Specification, the mapping provides a correlation between

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devices on the first data transport medium (e.g., workstations) and the storage devices through one or more steps. See, '035 Patent col. 1, lines 6 through col. 2, line 5 and col. 8, lines 67 – col. 9, line 5.

In the Chaparral Litigation, the U.S. District Court for the Western District of Texas adopted the definition that a "map" contains a representation of a device on one side of the storage router to a storage device on the other side (e.g., from a Fibre Channel host device to a SCSI storage device). See, Markman Order, Exhibit A, page 12. The mapping of the '035 Patent associates the host device(s) on the first transport medium (e.g., workstations) with storage devices on the second transport medium. Thus, the mapping can include mapping from a host workstation identifier (e.g., address or other identifier) to a virtual representation of a storage device (e.g., a virtual Logical Unit Number (LUN)), and potentially even further from the virtual representation of the storage device to a physical representation of the storage device (e.g., a physical LUN).

It should be expressly understood that the 'mapping' of the present invention is not identical to the concept of "virtualization." In virtualization, a storage device (or portion thereof) is presented with a particular logical address to the hosts or workstations. While it is clear that the present invention can include virtualization as part of the mapping (e.g., the map can include the mapping from a virtual representation of the storage (virtual LUN) to a physical representation of the storage (physical LUN)), such virtualization is not, in and of itself, a mapping between devices on the first and second data transport media as defined in the '035 Patent. See, '035 Patent, col. 8, line 65-67. In fact, this type of virtualization was available in a number of RAID systems at the time Petal was written. Virtualization does not require that representations of workstations on one side of the storage router be mapped to a storage device(s) on the other side of the storage router.

Petal does not disclose, teach or suggest a map that maps between devices connected to the first transport medium (e.g., workstations) and storage devices connected to the second transport medium as recited in Claim 11 of the '035 Patent. In Petal there is simply no map that associates host devices (i.e., the Petal clients) with the storage devices or representations of the storage devices. At best, Petal teaches "virtualization" of storage devices. In other words, Petal discusses a virtual to physical mapping of the storage devices rather than a mapping from the device making a request (e.g., workstation) to the storage device for which the request is intended. Petal states:

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The basic problem is to translate virtual addresses of the form
<virtual-disk-identifier, offset> to physical addresses of the form
<server-identifier, disk-identifier, disk-offset>.

See Petal, page 85-86, sections 2.1-2.3 and Figure 4 (entitled "Virtual to Physical Mapping").

In Petal, a virtual disk directory of virtual disks is mapped to a global directory which is mapped to physical disks. *Id.* A client workstation provides a virtual disk identity which is translated into a global map identifier. *Id.* The global map determines the server responsible for translating the given offset. *Id.* The physical map of the specified server translates the global map identifier and offset to a physical disk and an offset within that disk. See *Id.*, page 86, col. 1, section 2.1. Thus, the mapping of Petal only represents the virtualization mapping of storage devices and does not correlate or associate the storage devices (either virtual or physical) to particular Petal clients (e.g., workstations) on the other side of the Petal server. In fact, the virtualization-type mapping described in Petal is simply a description of the virtualization technique generally used in RAID systems at the time of Petal.

The Examiner correctly points out that, in Petal, a disk identifier used by clients to reference a particular virtual disk is "mapped" to a physical identifier. However, this is simply virtualization-type mapping. There is no correspondence (or map) made from the Petal clients to the storage devices (or portions thereof) behind the Petal Server. Put another way, there is no mechanism disclosed in Petal to perform the function of mapping a particular client workstation to a particular storage device (or portion). Consequently, Petal teaches a virtualization scheme, not a "mapping between devices connected to the first transport medium and storage devices" as recited in Claim 11 of the '035 Patent.

4. Petal Does Not Disclose Implementing "Access Controls"

a. Implementing Access Controls Requires Allowing Access Using

NLLBPs

Claim 11 recites "implementing access controls" which requires allowing access using NLLBPs. As described in the '035 Patent, "access controls" are a particular form of security measure designed to prevent unauthorized access to particular storage devices or portions of storage devices by certain workstations. When "access controls" are implemented, particular workstations may be permitted access to particular storage devices or subsets of storage devices. See, e.g., FIGURE 3 of the '035 Patent (permitting access from particular workstations to undivided storage devices as well as divided subsections within a single storage

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device). According to the previously mentioned Markman Order, "access controls" means "providing controls which limit a computer's access to specific subset of storage devices or sections of a single storage device." See, Markman Order, Exhibit A, page 6.

The "access controls" of the '035 Patent allow access using a NLLBP such that requests from devices connected to the first transport medium (e.g., workstations) are directed to assigned virtual local storage on the storage devices. See, col. 8, lines 61-65. The '035 Patent recites:

The router can...map, for each initiator, what storage access is available and what partition is being addressed by a particular request. In this manner, the storage space provided by [storage devices] can be allocated to [devices connected to the first transport medium] to provide virtual local storage...

See '035 Patent, col. 8, lines 67 – col. 9, line 5.

Thus, the "access controls" described in the '035 Patent are device-centric in that they permit or deny access from particular devices connected to the first data transport medium (e.g., workstations) to particular storage devices (or subsets thereof) according to the map. The access controls are thus part of the configuration for routing commands from a device connected to the first transport medium to *defined* storage location(s) using NLLBPs (i.e., without requiring the overhead of high level protocols typically required by network servers) according to the map.

b. Petal Is Not an Anticipatory Reference Because Petal Does Not Enable Access Controls

In rejecting the limitation of "implementing access controls" the Examiner points to Petal, page 90, col. 2, section 4, which states in pertinent part:

...currently we do not provide any special support for protecting a client's data from other clients; however, it would not be difficult to provide security on a per virtual disk basis.

Applicants submit, however, that the statement "it would not be difficult to provide security on a per virtual disk basis," without more, does not enable security on per virtual disk basis in the UDP environment of Petal. UDP is primarily a broadcast protocol in which the computer issuing a UDP communication typically places UDP packets on a network without regard to the device that receives the packets.

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Petal provides no support as to how to implement its "security on a per virtual disk basis" for UDP broadcast packets communicated over an ATM transport medium. For example, a common security method in packet based networks is the use of access control lists ("ACLs"). While ACLs may be used to entirely block UDP communications (e.g., as in a firewall), Petal provides no suggestions on how to implement ACLs in a UDP environment to limit access to a portion of a server file system (e.g., a particular virtual disk). As Petal provides no support for providing security in the UDP/ATM environment, Applicants respectfully submit that Petal does not enable security and therefore cannot anticipate the limitation of "access controls" recited in Claim 11.

c. There Is No Disclosure or Teaching In Petal That The 'Security' Referenced Therein Would Allow Access Using NLLBP

Even though the Petal article states that "it would not be difficult to provide security on a per virtual disk basis" there is no teaching or suggestion as to how such security would be provided. Certainly, there is no teaching or suggestion in Petal that a 'security' feature could be implemented to allow access using an NLLBP. It simply is unclear what type or manner of 'security' Petal references. For example, security can be a simple password-based security scheme, or something much more complex.

Moreover, even if security were implemented in Petal, there is no teaching or suggestion that such security would be implemented to allow access using a NLLBP. It would appear that any security implemented would be on top of the high level RPC over UDP scheme of Petal. Again, this would appear to require the high-level protocols and would not provide access using an NLLBP. Thus, even if security were applied to the system of Petal, this does not suggest access controls that allow access using an NLLBP.

d. Petal Does Not Render The Access Controls Limitation Of Claim 11 Obvious

Applicants note that that a non-enabling reference may qualify as prior art for the purpose of obviousness under 35 U.S.C. §103. See, *Symbol Technologies, Inc. v. Opticon*, 935 F.2d. 1569, 1578 (Fed. Cir. 1991) ("while a reference must enable someone to practice the invention in order to anticipate under §102(b), a non-enabling reference may qualify as prior art for the purpose of determining obviousness under §103(a)"). However, even if the rejection of "implementing access controls" is read as an obviousness type rejection under 35 U.S.C. §103,

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Applicants assert that the rejection must fail because Petal, at best, only makes it 'obvious to try' some unspecified form of security.

"An 'obvious-to-try' situation exists when a general disclosure may pique the scientist's curiosity, such that further investigation might be done as the result of the disclosure, but the disclosure itself does not contain a sufficient teaching of how to obtain the desired result, or that the claimed result would be obtained if certain direction were followed." *In re Eli Lilly & Company*, 902 F.2d 943, 945, 14 USPQ.2d 1741 (Fed Cir. 1990). "Obvious-to-try", however, is not the standard for obviousness under §103. See, *In Re O'Farrell*, 853 F.2d 894, 902, 7 USPQ.2d 1673 (Fed. Cir. 1988). For example, the statement in a patent that "the user of the external field canceling method . . . can allow for gradient fields to be produced with greatly reduced problems" provided only general guidance as to the form of the claimed invention and how to achieve it but did not provide sufficient guidance to render the claimed invention obvious. See, *In Re Roemer*, 258 F.3d, 1303, 1309-10, 59 USPQ.2d 1527 (Fed. Cir. 2001). Similarly, the Petal reference does not provide sufficient guidance as to what is meant by "security" or how to implement such a "security" feature; and certainly does not provide any guidance on how to implement "access controls" as recited in Claim 11 of the '035 Patent.

At best, the statement in Petal that "currently we do not provide any special support for protecting a client's data from other clients; however, it would not be difficult to provide security on a per virtual disk basis" is an invitation-to-try to implement some unspecified security feature on a per virtual disk basis. The statement does not provide any teaching or suggestion as to how the security feature would be achieved, much less how "access controls" to allow access using NLLBPs would be achieved. Thus, while it may be 'obvious-to-try' some unspecified security feature based on the above-cited statement, one is left completely in the dark as to how such security would be achieved.

Moreover, the Examiner has not pointed to any art or other evidence in the record such that one of ordinary skill in the art would have a reasonable expectation of success in implementing the claimed "access controls" to allow access using an NLLBP in a UDP/ATM environment to limit access to a particular virtual disk. If the Examiner is relying on his own knowledge that one of skill in the art would know how to implement "access controls" to allow access using an NLLBP on a per virtual disk basis in the Petal environment, then Applicants respectfully request that the Examiner provide an affidavit detailing the data on which the Examiner relies for this position, or alternatively allow Claim 11. See 37 CFR 1.107(b) and MPEP 707.05.

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5. Claim 12

Claim 12 depends from Claim 11 and recites that "the mapping between devices connected to the first transport medium and the storage devices includes allocating subsets of storage space to associated devices connected to the first transport medium, wherein each subset is only accessible by the associated device connected to the first transport medium."

Thus, in Claim 12, hosts on the first transport medium are allocated storage devices (or subsets of storage devices) in the mapping such that the allocated storage only is accessible by those associated hosts on the first transport medium. In other words, storage is allocated to specific hosts on the first transport medium. This is supported by the Markman Order in which the court adopted the construction that "allocation of subsets of storage space to associated Fibre Channel devices, wherein each subset is only accessible by the associated Fibre Channel device" means that subsets of storage are allocated to specific fibre channel devices for purposes of the '972 Patent. See, Markman Order, Exhibit A, pages 6-7.

As discussed above in more detail, the mapping of Petal does not allocate storage to particular Petal clients, but simply provides a mapping between a virtual disk identification and physical disk identification. Consequently, Petal does not anticipate Claim 12.

6. Summary

In sum, Petal fails to teach: (1) "allowing access from devices connected to the first transport medium to the storage device using native low level block protocols," (2) "mapping between devices connected to the first transport medium and the storage devices" and (3) "implementing access controls."

Instead, Petal teaches a system in which high level RPC calls in UDP packets must be transformed into low-level SCSI commands by the Petal server. Further, there is no disclosure, teaching or suggestion in Petal that clients on one side of the Petal server should be mapped to storage devices on the other side of the Petal server. Moreover, access controls to allow access using NLLBPs are not disclosed, taught or suggested in Petal nor is any other security method. At most, Petal suggests that it would be 'obvious-to-try' adding an undefined security measure, without providing any direction as to how to do so with a reasonable expectation of success. Therefore, Applicants submit that Petal does not anticipate (or render obvious) the

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present invention as recited in Claim 11, and respectfully requests allowance of such claim. Applicants also respectfully request allowance of Claims 12-14 as representing further limitations on Claim 11.

C. Claims 7-10

Applicants respectfully submit that independent Claim 7 is distinguishable from Petal for similar reasons as discussed above with reference to Claim 11, as well as additional reasons. For completeness, the Applicants will review the differences discussed above with respect to Claim 11, but for the sake of brevity will summarize the explanations of these differences rather than repeating entire arguments already presented.

1. Overview of Claim 7

Claim 7 recites:

A storage network, comprising:
a first transport medium;
a second transport medium;
a plurality of workstations connected to the first transport medium;
a plurality of storage devices connected to the second transport medium; and
a storage router interfacing between the first transport medium and the second transport medium, the storage router providing virtual local storage on the storage devices to the workstations and operable:
to map between the workstations and the storage devices;
to implement access controls for storage space on the storage devices; and
to allow access from the workstations to the storage devices using native low level, block protocol in accordance with the mapping and access controls.

Claim 7, thus, specifies a "storage router" that maps between workstations and storage devices, implements access controls and allows access from workstations to the storage devices using NLLBP in accordance with the mapping and access controls. As with Claim 11, Applicants submit that the system of Petal does not disclose, teach or suggest i) "allow[ing] access from the workstations to the storage devices" using NLLBP, ii) "map[ping] between the workstations and the storage devices, and iii) "implement[ing] access controls".

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2. Petal Does Not Disclose "Allow[ing] Access" From A Workstation Using NLLBP

The present invention, in accordance with Claim 7, allows workstations to access storage devices using a NLLBP. A NLLBP, as discussed above, is a set of rules or standards that enable computers to exchange information and do not involve the overhead of high level protocols and file systems typically required by network servers. Thus, the workstations described in Claim 7 can access the claimed storage devices using low level NLLBP commands which have not been translated from high level commands.

Petal, on the other hand, teaches a system in which a Petal client issues high level commands as RPCs in UDP packets, where the RPC calls a function of the Petal server Unix operating system. The Petal server must transform the high level RPC in UDP into a low level SCSI command by implementing the called procedure to generate the appropriate SCSI command(s). Petal, thus, uses a traditional RPC scheme that involves the overhead of high level protocols typically required by traditional network servers. Consequently, the Petal server does not allow the Petal clients to access the storage devices using an NLLBP.

3. Petal Does Not Disclose a "Map" Between Workstations And Storage Devices

The storage router of Claim 7 maps between workstations connected to the first transport medium on one side of the storage router and the storage devices located on the other side of the storage router. This mapping is more than mere virtualization as the storage router associates workstations with particular storage devices or subsets of storage devices.

Petal does not disclose, teach or suggest a map that associates particular devices connected to the first transport medium with particular storage devices (or subsets thereof). Rather, Petal teaches that a virtual to physical mapping (i.e., virtualization of the storage device) takes place. There is, however, no correspondence made between the clients and storage devices (or portions thereof) in the mapping of Petal; i.e., there is no mechanism disclosed to say "this client maps to that storage device" on the other side of the Petal server. Consequently, Petal teaches a virtualization scheme not a "mapping" between workstations and storage devices.

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4. Petal Does Not Provide Access Through "Access Controls"

As discussed above with respect to Claim 11, the sole statement in Petal relevant to access controls is "currently we do not provide any special support for protecting a client's data from other clients; however, it would not be difficult to provide security on a per virtual disk basis," does not in fact disclose or teach "access controls" in any anticipatory manner. This statement provides, at best, a suggestion that it is 'obvious-to-try' an undefined security measure in the UDP/ATM system of Petal. Applicants therefore submit that Petal does not disclose, teach or suggest a supervisor unit that implements "access controls."

5. Claim 8

Claim 8 depends from Claim 7 and recites that the access controls "include an allocation of subsets of storage space to associated workstations, wherein each subset is only accessible by the associated workstation." Thus, the claimed access controls allocate subsets of storage to particular workstations. Applicants respectfully submit that Petal does not teach this feature of Claim 8 as Petal does not describe or suggest allocating storage or subsets of storage to particular clients.

6. Summary

Petal fails to disclose, teach or suggest a storage router which performs the functions of i) "allow[ing] access from the workstations to the storage devices" using NLLBP, ii) "map[ping] between the workstations and the storage devices, and iii) "implement[ing] access controls."

Instead, Petal teaches a Petal server that transforms higher level RPC calls in UDP packets to generate low-level SCSI commands for communicating with storage devices. Also, there is no disclosure, teaching or suggestion that the Petal server should map clients on one side of the Petal server to storage devices on the other side of the Petal server. Moreover, Petal does not disclose or suggest providing "access controls" as claimed, nor any other security method. At most, it is suggested that it would be 'obvious-to-try' adding security without providing any direction as to how to do so with a reasonable expectation of success. Therefore, Applicants submit that Petal does not anticipate or render obvious the present invention as recited in Claim 7, and respectfully requests allowance of Claim 7. Applicants also respectfully request allowance of Claims 8-10 as representing further limitations on Claim 7.

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II. Rejections Under 35 U.S.C. §103

A. Introduction

Claims 1-6 and 10 are rejected under 35 U.S.C. §103(a) as being unpatentable over Petal in view of Quam, Cummings, Crouse et al., and Pisello et al.

As discussed above, with reference to independent Claims 7 and 11, Petal fails to disclose, teach or suggest i) "allow[ing] access from the workstations to the storage devices" using NLLBP, ii) "map[ping] between the workstations and the storage devices, and iii) "implement[ing] access controls."

In order to establish a *prima facie* case of obviousness, the Examiner must show: that (1) the prior art references teach or suggest all of the claim limitations, (2) that there is some suggestion or motivation in the references (or within the knowledge of one of ordinary skill in the art) to modify or combine the references and (3) that there is a reasonable expectation of success. M.P.E.P. 2142, 2143; *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991). The Examiner must explain with reasonable specificity at least one rejection – otherwise, the Examiner has failed procedurally to establish a *prima facie* case of obviousness. M.P.E.P. 2142; *Ex parte Blanc*, 13 U.S.P.Q.2d 1383 (Bd. Pat. Application. & Inter. 1989). When the motivation to combine the teachings of the references is not immediately apparent, it is the duty of the Examiner to explain why the combination of the teachings is proper. *Ex parte Skinner*, 2 U.S.P.Q.2d 1788, 1790 (Bd. Pat. App. & Inter. 1986).

Applicants respectfully submit that the Examiner has failed to establish a *prima facie* case of obviousness as the references do not disclose, teach or suggest all of the claim limitations of Claims 1-6 and 10. More particularly, the references do not disclose, teach or suggest a "supervisor unit" operable to i) "map between devices connected to the first transport medium and the storage devices," ii) "implement access controls for the storage space on the storage devices" and iii) "allow access from devices connected to the first transport medium to the storage devices using a NLLBP." Furthermore, Applicants submit that one of ordinary skill in the art would not be motivated to combine Petal with Quam, Cummings, Crouse or Pisello.

B. Claim 1

In rejecting Claim 1, the Examiner relies on the previously discussed rejections under 35 U.S.C. §102(b) to identify where various features of Claim 1 are found in the Petal reference. Applicants respectfully submit, however, that several of the features of Claim 1 which are

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rejected under Petal are not disclosed, taught or suggested by the reference, as discussed above with respect to Claims 7 and 11. Again, for the sake of brevity the Applicants will summarize the previously presented arguments rather than repeating them in their entirety.

1. Overview of Claim 1

Claim 1 recites:

A storage router for providing virtual local storage on remote storage devices to devices, comprising:
 a buffer providing memory work space for the storage router;
 a first controller operable to connect to and interface with a first transport medium;
 a second controller operable to connect to and interface with a second transport medium; and
 a supervisor unit coupled to the first controller, the second controller and the buffer, the supervisor unit operable to map between devices connected to the first transport medium and the storage devices, to implement access controls for storage space on the storage devices and to process data in the buffer to interface between the first controller and the second controller to allow access from devices connected to the first transport medium to the storage devices using native low level, block protocols.

Thus, Claim 1 recites a "storage router" with a "supervisor unit" operable to i) "map between devices connected to the first transport medium and the storage devices," ii) "implement access controls for storage space on the storage devices," and iii) "allow access from devices connected to the first transport medium the storage devices using NLLBP." As discussed above, these claimed features of the present invention allow each host connected to the first transport medium to access some portion of storage on the storage devices associated with that host using an NLLBP.

2. Petal Does Not Disclose "Allow[ing] Access" From A Workstation Using NLLBP

The present invention, in accordance with Claim 1, allows workstations (or other host devices) to access storage devices using an NLLBP. An NLLBP, as discussed above is a set of rules or standards that enable computers to exchange information and do not involve the overhead of high level protocols and file systems typically required by network servers. Thus, the devices of Claim 1 connected to the first data transport protocol can access the storage devices using commands that do not require translation from a high level protocol to a low-level protocol.

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The Examiner again relies on Petal for the rejection of this limitation of Claim 1. Petal, however, teaches a system in which a Petal client issues high level commands as an RPC in UDP packets. The RPC subsequently calls a function of the Petal server Unix operating system. The Petal server must then transform the RPC in UDP to generate the appropriate SCSI READ/WRITE commands. Thus, Petal uses a traditional RPC scheme that, like the prior art systems the invention of the '035 Patent was designed to overcome, involves the overhead of high level protocols typically used by traditional network servers. Consequently, the Petal server does not allow the Petal clients to access the storage devices using an NLLBP. Thus, Petal does not (and cannot) show a "supervisor unit" operable to "allow access from devices connected to the first transport medium the storage devices" using NLLBPs.

Moreover, the Examiner does not particularly point out where this feature of the present invention can be found in the other references. Therefore, Applicants respectfully request that the Examiner allow Claim 1.

3. Petal Does Not Disclose a "Map" Between Devices On The First Transport Medium and Storage Devices

The "supervisor unit" of Claim 1 maps between devices located on one side of the storage router and the storage devices located on the other side of the storage router. This mapping is more than mere virtualization as the supervisor unit associates workstations or other devices on one side of the storage router with particular storage devices.

The Examiner again relies on Petal in rejecting this limitation of Claim 1. Applicants respectfully submit, however, that Petal does not disclose, teach or suggest a unit that maps between devices connected to the first transport medium and storage devices connected to the second transport medium. Rather, Petal teaches that a virtual to physical mapping of the storage itself (i.e., virtualization of the storage devices). There is no association made between the clients and storage devices (or portions thereof) in the mapping of Petal. In other words, there is no mechanism disclosed to say "this client device maps to that storage device" on the other side of the Petal server). Consequently, Petal teaches a virtualization scheme, not a mapping between workstations and storage devices.

Applicants further submit that Examiner has not pointed out where this feature of the present invention can be found in the other references and therefore has not made out a *prima facie* case of obviousness. Therefore, Applicants respectfully request withdrawal of the rejection and allowance of Claim 1.

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4. Petal Does Not Disclose, Teach or Suggest The "Access Controls" Limitation Of Claim 1

As discussed above, the statement in Petal that "currently we do not provide any special support for protecting a client's data from other clients; however, it would not be difficult to provide security on a per virtual disk basis" is, at best, an 'invitation to try' to a security feature, and not necessarily providing "access controls" to allow access using NLLBPs on a per virtual disk basis. The statement does not by itself provide any teaching or suggestion as to how the "access controls" recited in Claim 1 can be achieved.

Thus, while it may have been 'obvious-to-try' a security feature based on the above-cited statement, one of ordinary skill in the art is left completely in the dark as to how such security feature would be achieved, much less how one would achieve "access controls" using NLLBPs as recited in Claim 1. As the cited case law points out, an invitation to try a feature is not enough in and of itself to render a claimed invention obvious.

Moreover, the Examiner has not pointed to any art or other evidence on the record such that one of skill in the art would have a reasonable expectation of success in implementing access controls for a UDP/ATM environment.

5. There Is No Showing That The Remainder Of The References Contain The Limitations Missing From Petal

The Examiner relies on Quam, Cummings, Crouse and Pisello in rejecting protocol and hardware specific features of the claimed invention. Applicants note, however, that the Examiner has not pointed out where these cited references make up for the deficiencies of Petal with respect to allowing access from a device connected to the first transport media to a storage device using a NLLBP, mapping, and access controls. As these features are not disclosed or taught in Petal, as discussed above, and are not pointed to in the other references, the burden of making out a *prima facie* case of obviousness has not been met. Therefore, Applicants respectfully request allowance of Claim 1.

C. Claim 2

Applicants respectfully submit that Claim 2 depends from Claim 1 and represents further limitations thereon. With respect to Claim 2, the claim recites that the "supervisor unit" "maintains and allocation of subsets of storage space to associated devices connected to the

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first transport medium, wherein each subset is only accessible by the associated device connected to the first transport medium." As discussed above in conjunction with Claims 8 and 12, the access controls allocate subsets of storage to particular devices on the first transport medium (e.g., workstations). Applicants respectfully submit that Petal does not disclose, teach or suggest this feature of Claim 2 as Petal does not describe or suggest allocating storage devices or subsets of storage devices to particular clients. Therefore, Applicants respectfully request allowance of Claim 2.

D. Claims 3-6 and 10

Applicants respectfully submit that Claims 3-6 and 10 depend directly or indirectly from Claims 1 and 7, respectively. Therefore, Applicants respectfully request allowance of these claims as representing further limitations on the respective independent claims and any intervening claims.

E. Summary: There is No *Prima Facie* Showing of Obviousness

Applicants respectfully submit that the Examiner has failed to establish a *prima facie* case of obviousness for Claims 1-6 and 10 as the prior art references do not disclose, teach or suggest all of the claim limitations. Specifically, the prior art cited by the Examiner does not appear to teach a "supervisor unit" that is operable to i) "map between devices connected to the first transport medium and the storage devices," ii) to "implement access controls for the storage space on the storage devices" and iii) to "allow access from devices connected to the first transport medium to the storage devices using a NLLBP." While the Examiner has provided a detailed discussion of Petal to attempt to show where these features are found, Applicants respectfully submit that Petal does not disclose or teach the claimed limitations, as discussed above in relation to the § 102 rejections. Furthermore, the remaining cited references (Quam, Cummings, Crouse and Pisello) do not make up for the deficiencies in Petal. Accordingly, Applicants respectfully request allowance of Claims 1-6 and 10.

III. Conclusion

Applicants appreciate the Examiner's diligence in issuing thorough office actions in multiple reexamination cases so quickly. Applicants respectfully submit, however, that Claims 7-9 and 11-14 are distinguishable from the prior art Petal reference, and that Claims 1-6 and 10

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are distinguishable from the Petal, Quam, Cummings, Crouse and Pisello references. Therefore, Applicants respectfully request allowance of all claims subject to reexamination.

Applicant has now made an earnest attempt to place this case in condition for allowance. Other than as explicitly set forth above, this reply does not include an acquiescence to statements, assertions, assumptions, conclusions, or any combination thereof in the Office Action.


For the foregoing reasons and for other reasons clearly apparent, Applicant respectfully requests full allowance of Claims 1-14. The Examiner is encouraged to telephone the undersigned at the number listed below for any questions or issues that arise during this procedure, and specifically for discussion and/or prompt action in the event any issues remain.

This Reply was served via First Class Mail on April 6, 2005 to Larry E. Severin, Wang, Hartmann & Gibbs, PC, 1301 Dove Street #1050, Newport Beach, CA 92660 and William A. Blake, Jones, Tullar & Cooper, PC, P.O. Box 2226 EADS Station, Alexandria, VA 22202.

The Director of the U.S. Patent and Trademark Office is hereby authorized to charge any fees or credit any overpayments to Deposit Account No. 50-3183 of Sprinkle IP Law Group.

Respectfully submitted,

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